

Commonwealth of Massachusetts

Public Review Draft

Commonwealth of Massachusetts' Phase 1 Application to the National Disaster Resilience Competition

Funding Opportunity: #FR-5800-N-29

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Send written comments by 5:00 PM on March 25, 2015 to Kathleen Baskin, Executive Office of Energy and Environmental Affairs, Suite 900, Boston, MA 02114 or kathleen.baskin@state.ma.us.

Exhibit A – Executive Summary

Commonwealth of Massachusetts

ExhibitAExecutiveSummaryMA.pdf

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The Problem. MA communities need to increase resilience to events such as 6 presidentially declared disasters that impacted the Commonwealth in 2011, 2012, and 2013 (“disasters”). These events caused tremendous damage to infrastructure, housing, environment, and local economies, and areas of low- to moderate- income have had difficulty recovering. Seawalls, housing, and municipal infrastructure were damaged; beaches and riverbanks eroded; and areas de-vegetated. Compounding this need for resilience is the evidence that the climate has changed and is predicted to continue to so do. Temperatures are increasing, sea level is rising and precipitation is more extreme. These changes are making it even more challenging for communities to withstand extreme events.

Threshold Criteria. To qualify for the National Disaster Resilience Competition, the MA Team demonstrates that 4 “target areas” in MA satisfy the HUD criteria of Most Impacted and Distressed and have demonstrated Unmet Recovery Needs. These target areas are: Springfield, which was by five of disasters, a portion of Oak Bluffs, MA, impacted by Hurricane Sandy, and portions of Shelburne Falls (Buckland side) and Charlemont which were impacted by Hurricane Irene.

Capacity of the Massachusetts Team. MA has assembled an experienced Team that is eager to assist communities in becoming more resilient. The MA Team, led by the MA Department of Housing and Community Development with project support by the Executive Office of Energy and Environmental Affairs, includes other state agencies, federal agencies, regional partners (including five regional planning agencies), not-for-profit community organizers, universities and local municipalities.

Need and Extent of Problem. MA has had an increasing frequency and intensity of extreme weather. Coastal storms, land-bound hurricanes, snow storms, and tornadoes have ravaged the state; they were particularly devastating to low- to moderate- income communities. Although federal relief funding has helped significantly, it did not cover the total cost of repairing and restoring the damage. The MA Team is committed to developing projects that address the post-disaster threats remaining as a result of existing unmet recovery needs and potential threat due to climate change. Team Members

have been actively addressing these issues through the release of EEA's 2011 Climate Change Adaptation Report, which evaluated strategies to adapt to predicted climate change, and its Coordinated Climate Preparedness Initiative and its numerous resiliency projects. The time is opportune to envision and create building blocks for a more resilient MA with anthropogenic and natural systems better equipped to cope with extremes and new climate change patterns.

Approach. To prepare for this Phase 1 application, the MA Team reached out to local, state, federal, nonprofit, university and private stakeholders (see Appendix I). The consultations took the form of emails, individual calls, sharing of data and information, site visits, meetings, and public hearings. MA needs to move toward the next step of climate change resiliency. Project ideas include: a **'Resilient Building Competition'** for property owners to 'live with water', an **Energy Justice Program** to enable low- to moderate- income populations to gain access to clean energy, **'Green by the Stream/Green by the Shore'** to encourage green infrastructure, **'Plant a Tree Program'** to increase trees in rural and urban areas, an interactive **Data and Mapping Tool** to help communities visualize climate change, and **Sharpened the Science** to produce the latest climate science for MA.

Leverage and Commitments. Committed resources by the MA Team will broaden the reach of our resiliency objectives beyond our target areas throughout the Commonwealth. They include the MA Executive Office of Energy and Environmental Affairs' and its agencies' Community Clean Energy Resiliency Grants, Dam/Seawall Repair and Removal Grant and Loan Fund, Coastal Community Resilience and Green Infrastructure Grant Programs, Land Use Priority Plans, and investment in parks and water/wastewater infrastructure. They also include MA Department of Transportation's projects on Stream Crossings, Sea Level Rise and Asset Vulnerabilities.

Drop Box. Many files referenced in this application are stored on (ADDRESS.)

Exhibit B – Threshold Requirements

Commonwealth of Massachusetts

ExhibitBThresholdRequirementsMA.pdf

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EXHIBIT B – THRESHOLD REQUIREMENTS

Meet General Section Administrative Threshold: Massachusetts was impacted by six presidentially declared disasters in 2011, 2012, and 2013 (“disasters”). The target area of Springfield, within Hampden County, designated by HUD as a Most Impacted County in May 2014, was affected by 5 disasters (excluding Hurricane Sandy) and meets all Threshold requirements outlined in HUD’s FY2014 NOFA for Discretionary Programs. The June 1, 2011 Tornado (“Tornado”) and the October 29-30, 2011 snowstorm (“Halloween Storm”) caused the most damage to Springfield. The sub-county target area of census block group numbers 250072002001 and 250072002004 in Oak Bluffs, MA meets all Threshold requirements in HUD’s FY2014 NOFA for Discretionary Programs. This target area was impacted by the disaster known as Hurricane Sandy on October 26-31, 2012. The sub-county target areas of census block group number #250110415023 in the Buckland portion of Shelburne Falls, MA and the census block group number #250110401001 in Charlemont, MA meet all Threshold requirements in HUD’s FY2014 NOFA for Discretionary Programs. These target area were impacted by the disaster known as Hurricane Irene on August 27-29, 2011.

Eligible Applicant: Commonwealth of Massachusetts

Eligible County: Hampden County in MA

Eligible Activity: Massachusetts will demonstrate that each CDBG-NDR activity proposed is an eligible activity or will request an eligibility waiver for the activity with the Phase 2 application.

Incorporate Resilience: Massachusetts incorporated resilience into its project approach, previously applied them in projects listed in Exhibit G, and will incorporate resilience in all Phase 2 projects.

Meet a National Objective: Massachusetts will meet a CDBG-NDR national objective (low-and moderate income, slum or blight or urgent community development need) in each Phase 2 activity, with the exception of general administration and planning which is exempt from this requirement, or will request and receive a waiver from HUD.

Meet Overall Benefit: At least 50% of the NDRC funds requested in Massachusetts's Phase 2 application will benefit low and moderate income populations in the form of services, area benefit, housing, or jobs in order to meet the national objective of benefit to low and moderate income persons, or MA will request and receive a waiver from HUD.

Establish Tie-Back: Any activity in the Massachusetts Phase 2 application will have a direct tie back to the six qualified disasters in Massachusetts between 1/1/2011 and 12/31/2013.

One Application per Applicant: Commonwealth of Massachusetts will submit one application.

Execute Certifications: All required certifications can be found in [Appendix C](#).

Target Area #1: City of Springfield in Hampden County, Massachusetts

(1) Most Impacted and Distressed Characteristics: Hampden County, MA is listed as a most impacted and distressed County in HUD's Appendix A.

(2) Unmet Recovery Needs

2.1 Housing

2.1.1 Identified Needs. The June 2011 tornado significantly impacted Springfield's housing stock. 255 residential structures and 615 residential units were damaged and condemned. FEMA estimated that 306 of these homes sustained severe or major damage. Fourteen units owned by the Springfield Housing Authority and 26 owned by Hill Homes Cooperative were severely impacted by the 2011 tornado, and subsequently demolished. Springfield plans to rebuild these units but has inadequate resources from insurance, FEMA and Small Business Association (SBA) to do so.

2.1.2 Projects Undertaken. Rebuilding has been funded through a combination of SBA disaster loans, bank loans, homeowner savings and donated resources. FEMA paid \$515,098 for real property full verified loss, and \$261,538 for total repair and replacement as of July 18, 2013. SBA approved \$4,920,900 in loans to 131 households as of July 15, 2013. Despite considerable investment, existing funding does meet the unmet needs created by the federally qualified disasters.

2.1.3 Available Funding and Remaining Unmet Needs. 40 units will continue to be displaced due to inadequate funding due to the five federally qualified disasters that hit Springfield. The Replacement Costs for the 14 units owned by the Springfield Housing Authority is \$3,780,000, with \$1,572,700 in committed funds; this leaves an unmet need of \$2,207,300. The replacement cost for 26 units of HUD 202 housing, the Hill Homes cooperative is \$17,262,465. The development has \$14,788,621 in funding identified, but an unmet need of \$2,473,845. The total unmet need for all replacement units is \$4,951,145. The total amount of CDBG-DR funds budgeted for the two projects is \$1,600,000.

2.1.4 Supporting Evidence. See Appendix X for supporting documentation for the 40 addresses identified by the City of Springfield during a February 2015 windshield survey that have unmet housing recovery needs from the federally declared disasters. Photos of the properties and certifications from property owners of the 40 units with inadequate resources available from insurance, FEMA, and SBA for completing repairs to housing units are available in Appendix X.

2.2 Infrastructure

2.2.1 Identified Needs. The 2011 June Tornado devastated the heart of the City, eliminating trees and other vegetation, and the Halloween Storm added additional damage to the city's infrastructure. Damage from the 5 declared disasters has not been repaired due to inadequate resources. While CDBG-DR funds have been allocated to infrastructure projects that were damaged during these storm events, permanent public infrastructure remains damaged, and there are inadequate funds for making repairs to damaged schools, roads, sidewalks, dams and city infrastructure.

2.2.2 Projects Undertaken. The impacts to Springfield's infrastructure resulted in 150 FEMA project worksheets. The total amount of obligated recovery funds is \$80,000,000, but not all infrastructure projects are covered by FEMA expenses. \$626,081 has been spent on sidewalks, and fencing. \$1.8 billion of projects are in progress or scheduled for the next few years, including: Union Station (\$82M); viaduct reconstruction (\$265M); renewable energy production facility (\$150M); fire station

(\$25M); health center expansion (\$15M); commercial center (\$39M); police dept expansion (\$8M); senior center (\$12M); and schools (\$117.9M). The Federal Highway Administration (FHWA) provided \$3,448,189.27 to repair road damage from the Halloween Storm (Appendix X).

2.2.3 Available Funding and Remaining Unmet Needs. Springfield completed extensive repairs to infrastructure damaged during the disasters, but unmet infrastructure needs remain due to limited funding. The remaining damage includes reconstruction of roads due to damage from repair vehicles after the storms. FHWA/FEMA provided \$2,243,855 of the needed \$2,669,830 in funding for clearing debris and repairing infrastructure damaged by storm debris (see Appendix X for engineering report, including sources and uses statement); unmet need is \$425,830. Storm runoff severely damaged the City's Flood Control Drainage System on Riverside Road and needs to be upgraded/replaced. The project cost is \$6,000,000 and with \$50,000 from the City, unmet need is \$5,950,000 (See Appendix X for engineering report with sources/uses statement). Total infrastructure unmet need is \$6,375,975.

2.2.4 Supporting Evidence. See Appendix X for a stamped engineering certificate from C. M. Cignoli, P.E., Springfield Director of Public Works, certifying damage estimates for repairing unmet need.

2.3 Economic Revitalization: N/A

2.4 Environmental Degradation

2.4.1 Identified Needs. Environmental damage from the disasters has yet to be addressed, and currently the City does not have the resources to full repair the damage. With events from a tornado to snowstorms, the City of Springfield has faced a variety of impacts. The tornado de-vegetated a large swath of the City, and the snowstorms decimated the remaining vegetation. As a result, the stormwater runoff, road flooding, and stream flooding have increased. The disasters created significant drainage issues on Roosevelt Ave, and on the Culvert Crossings of Dickenson and Tiffany Streets.

2.4.2 Projects Undertaken. Springfield's Parks Department retrofits drainage whenever it constructs a new or upgraded park; to date, 30 park drainage projects have been completed. Since 1987, the Parks Department has spent \$15,000,000 in Forest Park and \$5,000,000 citywide.

2.4.3 Available Funding and Remaining Unmet Needs. Funding needed to repair to the Van Horn Dam, Watershops Pond, Debris Removal and Drainage/Culvert is \$2,770,000 (see Appendix for engineering report(s), which includes a table showing sources and uses of funds). With \$150,000 of funding available from the City, unmet need for environmental degradation is \$2,620,000.

2.4.4 Supporting Evidence. Appendix X has supporting documentation describing remaining damage due to the disasters impacting the City of Springfield. This includes an Upper Van Horn Reservoir Dam Inspection/Evaluation Report (2009), an Inspection/Evaluation Report of the Watershops Pond Dam (2013), and report on Vegetative Debris Removal (2011). It also includes a summary signed by C. M. Cignoli, P.E. (See Appendix XX for HUD's MID-URN Checklist for Springfield.)

2. 5 Reconciliation of Unmet Need with Previously Allocated CDBG-DR Funds

MA Department of Housing and Community Development (DHCD) received \$7,210,000 of FY13 CDBG-DR funds of which a minimum of \$1,388,800 must be spent in Hampden County. \$5,960,134 has been spent, allocated, or recommended for approval, including \$1,376,535 in Hampden County. (See updated FY13 CDBG Action Plan). Springfield's total unmet need of \$13,947,120 (\$4,951,145 for housing, \$6,375,975 for infrastructure, and \$2,620,000 for environmental degradation) greatly exceeds both the remaining unspent or unallocated CDBG-DR funds of \$12,265 for Hampden County and \$1,249,866 for the entire state.

Target Area #2: Oak Bluffs sub-county area, Census Block Groups #250072002001 and 250072002004 (“Oak Bluffs target area”). (See Figure ExB-1).

(1) Most Impacted and Distressed Characteristics

1.1 Most Impacted Characteristics

2.1 Housing: N/A

2.2 Infrastructure

Hurricane Sandy did significant damage to the historic town of Oak Bluffs, located on Martha’s Vineyard. Road wash-out, bulkhead damage and coastal erosion from Hurricane Sandy caused damage to permanent infrastructure exceeding \$2M in Census Block Groups #250072002001/250072002004. North Bluff Seawall was damaged; repairs have been funded by MA Seaport Advisory Council (\$2M) and EEA Dam/Seawall Fund (\$3.6M) (Appendix X). Unrepaired damage to a wood bulkhead on East Chop Rd and Seaview Ave is estimated at \$664,588.00 (Appendix X) and unrepaired damage to the cliff embankment on East Chop Dr is estimated at \$4,119,508 (Appendix X).

2.3 Economic Revitalization: N/A

2.4 Environmental Degradation

Erosion of Oak Bluffs Town Beach (Pay/Inkwells Beaches) and erosion that clogged the inlet to nearby Sengekontacket Pond during Hurricane Sandy occurred outside of, but proximate to, Census Block Groups #250072002001/250072002004 and greatly affected residents and businesses of that area. The beach, is within walking distance of many of the low- to moderate- income residents in these Census Block Groups, nearest to the Steamship Authority in Oak Bluffs, and is an important tourist destination and critical to the local economy. Clogging of pond affected a shellfish habitat.

1.2 Most Distressed Characteristics

1.2.1 Disaster impacted low- and moderate- income households. More than 50% of the residents of the Oak Bluffs sub-county area are at less than 80% of the area median income. Census block group #250072002001 is at 58.57% and #250072002004 is at 52.94%.

(2) Unmet Recovery Needs

2.1 Housing: N/A

2.2 Infrastructure

2.2.1 Identified Needs. Unrepaired damage to a wood bulkhead on East Chop Rd and Seaview Ave is \$664,588.00 (Appendix X); unrepaired damage to the cliff embankment on East Chop Drive is \$4,119,508 (Appendix X). Total identified need is \$4,784,096. (See Figure ExB-2 for locations).

2.2.2 Projects Undertaken. The town paid \$40,228.65 (see Appendix X) to repair cracking asphalt and the eroding shoulder of Lower East Chop Rd. It also paid \$72,000 to stabilize the bulkhead damage at East Chop Rd and Seaview Ave and \$75000 to stabilize damage to the cliff on East Chop Drive.

2.2.3 Available Funding and Remaining Unmet Needs. There are no funds available to repair damage to East Chop Rd/Seaview Ave bulkhead (\$664,588.00) or the East Chop Drive cliff embankment. Total unmet need for infrastructure is \$4,784,096.

2.2.4 Supporting Evidence. See Appendix X for 2 FEMA Project Worksheets, 2 sources and uses statements, a MID-URN summary checklist, and a Release Deed to Confirm Ownership verifying that Oak Bluffs owns the parcel where \$4,119,508 in damages were incurred.

2.3 Economic Revitalization: N/A

2.4 Environmental Degradation

2.4.1 Identified Needs. Damage to Pay/Inkwells Beaches during Hurricane Sandy was \$1,165,284 (Appendix X) and at Sengekontacket Pond was \$553,086 (Appendix X), totaling \$1,718,370. (See Figure ExB-3 for locations).

2.4.2 Projects Undertaken. The town conducted initial dredging of the Pond's inlet (\$21,780).

2.4.3 Available Funding and Remaining Unmet Needs.

No funding is available to pay for damage to Pay/Inkwells Beaches; unmet need is \$1,165,284. With \$21,780 already spent by the town to dredge Sengekontacket Pond inlet, the unmet need is \$531,306. Total unmet need of environmental damage is \$1,696,590.

2.4.4 Supporting Evidence. See **Appendix X** for supporting documentation describing the remaining damage due to the storm events impacting the Oak Bluffs target area. This includes 2 FEMA worksheets, 2 sources and uses statements, and a MID-URN summary checklist).

2. 5 Reconciliation of Unmet Need with Previously Allocated CDBG-DR Funds

DHCD received \$7,210,000 of FY13 CDBG-DR funds of which \$5,960,134 has been spent, allocated, or recommended for approval. (**See updated FY13 CDBG Action Plan**). The Oak Bluff target area's total unmet need of \$6,480,686 (\$4,784,096 for infrastructure and \$1,696,590 for environmental degradation) greatly exceeds the remaining unspent or unallocated CDBG-DR funds of \$1,249,866 for the state.

Target Area #3: Shelburne Falls (Buckland portion), MA sub-county area, Census Block Group #250110415023 (“Shelburne Falls/Buckland target area”) is located in the northeast area of the Town of Buckland and includes the Buckland side of the Village of Shelburne Falls. (See Figure ExB-4).

(1) Most Impacted and Distressed Characteristics

1.1 Most Impacted Characteristics

2.1 Housing: N/A

2.2 Infrastructure: N/A

2.3 Economic Revitalization: N/A

2.4 Environmental Degradation

Hurricane Irene caused stream bank erosion starting near the Canadian border and extending through Vermont, New Hampshire, Massachusetts and Connecticut, causing significant nonpoint source pollution in the Connecticut River watershed, including its tributaries (i.e. Deerfield and Westfield Rivers) and in Long Island Sound (<http://earthobservatory.nasa.gov/IOTD/view.php?id=52059>). The Village of Shelburne Falls is widely recognized for its New England charm and iconic Bridge of Flowers. In addition to being a well-know tourist destination, it hosts industry and commercial operations serving other sectors, particularly on the Buckland side. The 2,200 residents of the Village of Shelburne, including those of the Shelburne Falls/Buckland target area, are served by the Shelburne Falls Fire District, a water supplier with wells along the North River (a tributary to the Deerfield River watershed) in Colrain, north of Census Block Group #250110415023. Hurricane Irene flooded the Fire District’s wells and severely eroded the river bank and land around the wells, which were off-line for 7 days following the storm. The wells are vulnerable to future flooding and complete loss unless the river bank is stabilized and the well heads are raised.

1.2 Most Distressed Characteristics

1.2.1 Disaster impacted low- and moderate- income households. At 57.28%, more than 50% of the residents of the Buckland portion of Shelburne Falls (Census Block Group #250110415023) are at less than 80% of the area median income.

(2) Unmet Recovery Needs

2.1 Housing: N/A

2.2 Infrastructure: N/A

2.3 Economic Revitalization: N/A

2.4 Environmental Degradation

2.4.1 Identified Needs. A design by Field Geology Services for restoration of damage to the Shelburne Falls Fire District well site along the North River in Colrain (Appendix X) will cost \$460,000. The project includes establishing a riparian buffer and stabilizing the stream bank with a constructed bankfull bench, boulder deflectors and toe wood structures along 700 feet of eroding bank.

2.4.2 Projects Undertaken. MA State Geologist, Steve Mabee (a UMass partner on this application), in partnership with New England Environmental, Inc., developed prototype Fluvial Erosion Hazard Maps of portions of the Deerfield River Basin with FEMA Hazard Mitigation Grant Program funding of \$70,211. Four prototype maps were prepared for 27 miles of stream in the Deerfield River basin affected by Tropical Storm Irene, including one for the East Branch of the North River in Colrain. The maps provide municipal planners with a tool to prioritize maintenance or mitigation at areas subject to fluvial erosion. Another project partner, FRCOG, received a Section 604b grant from MA Department of Environmental Protection (an EEA agency) of \$61,200, matching it with an additional \$4,507 for a total of \$65,707. This project involved a geomorphic assessment and a fish community/physical habitat survey of the North River, solutions to channel instabilities, and conceptual restoration designs

2.4.3 Available Funding and Remaining Unmet Needs.

No funding is available to pay for restoration of damage to the Shelburne Falls Fire District well site along the North River in Colrain; unmet need of environmental degradation is \$460,000.

2.4.4 Supporting Evidence. See **Appendix X** for supporting documentation describing the

improvements needed to the environment in the vicinity of the Shelburne Falls Fire District's wells.

This includes a report from Field Geology Services, one sources and uses statement, and a MID-URN summary checklist.

2. 5 Reconciliation of Unmet Need with Previously Allocated CDBG-DR Funds

DHCD received \$7,210,000 of FY13 CDBG-DR funds of which \$5,960,134 has been spent, allocated, or recommended for approval. (**See updated FY13 CDBG Action Plan**). The Shelburne

Falls/Buckland target area unmet need of \$460,000 for environmental degradation is less than the

remaining unspent or unallocated CDBG-DR funds of \$1,249,866 for the state. However, it is higher

than the HUD threshold of \$400,000. Assuming that the one of the other target areas (Springfield or

Oak Bluffs target area) is accepted by HUD, then the unmet need in one of those areas plus the unmet

need in the Shelburne Falls/Buckland target area exceeds DHCD's remaining unspent or unallocated

CDBG-DR funds of \$1,249,866 for the state.

Target Area #4: Charlemont sub-county area, Census Block Group #250110401001 (“Charlemont target area”). (See Figure ExB-X).

(1) Most Impacted and Distressed Characteristics

1.1 Most Impacted Characteristics

2.1 Housing: N/A

2.2 Infrastructure

On August 28, 2011 extreme rainfall from Hurricane Irene resulted in severely high river flows in the Deerfield River, causing significant damage to roads owned by MassDOT and the town of Charlemont. Nine repair projects were conducted in Charlemont on MassDOT’s or the town’s roadways using funding from the Federal Highway Administration. They were:

- Rte. 2 MM 26 to 29.5, Repair road, slope; clean debris; approaches to Trout Brook, \$150,000
- Rte. 2 MM 25.5 to 29.0, Channel clearance to protect walls and roadway, \$100,000
- Tower Road Bridge, Clear debris on inlet side of bridge, \$75,000
- Zoar Road Bridge, Deck repair, detour route for Route 2, \$100,000
- Rt. 8A, Slope repairs & road repairs, \$94,000
- North River Road, Slope repairs and road repairs, \$24,000
- South River Road, Slope repairs & road repairs, \$441,000
- Route 2, Project 606605 - Roadway Stabilization, \$2,184,548
- Route 2, Project 606606 - Retaining Wall Replacement, \$2,463,556

The total spent by FHWA to repair roads in Charlemont that were damaged by Hurricane Irene was \$5,632,105 (APPENDIX X).

2.3 Economic Revitalization: N/A

2.4 Environmental Degradation: N/A

1.2 Most Distressed Characteristics

1.2.1 Disaster impacted low- and moderate- income households. More than 50% of the residents of the Charlemont sub-county area are at less than 80% of the area median income. Census block group #250110401001 is at 52.72%.

(2) Unmet Recovery Needs

2.1 Housing: N/A

2.2 Infrastructure

2.2.1 Identified Needs. FHWA funds were used to repair the severe damage to the culvert on Route 2 in Charlemont over Trout Brook. Wingwalls, culvert header and roadway were severely damaged. However, because the repair work was performed using FHWA funds, the work allowed was limited to only that necessary to restore the pre-Hurricane Irene condition. While the culvert at this location is in good condition, it is undersized and has a stone-lined channel bottom. The smaller culvert span restricts natural stream flow, particularly during floods, causing other problems including scouring, erosion and high flow velocity. Clogging of the culvert caused washout during hurricane Irene. The stone-lined channel is also contributing towards high flow velocity. To fully meet the unmet need of this disaster, the culvert must be replaced with a large enough structure to pass fish, wildlife and high flows, and to prevent adverse impacts to important transportation routes and the ecological system. Cost of this project is \$1,167,000 (Appendix X).

2.2.2 Projects Undertaken. As described above, the total spent by FHWA to repair roads in Charlemont that were damaged by Hurricane Irene was \$5,632,105 (APPENDIX X).

2.2.3 Available Funding and Remaining Unmet Needs. There are no funds available to upgrade the culvert at Route 2 and Trout Brook to avoid future failure and resulting damage to infrastructure and environment. Unmet recover need is \$1,167,000.

2.2.4 Supporting Evidence. See **Appendix X** for engineering reports, one sources and uses statement, a MID-URN summary checklist, and verification from MassDOT that it was reimbursed \$5,632,105 by FHWA for damage to roadways in Charlemont caused by Hurricane Irene.

2.3 Economic Revitalization: N/A

2.4 Environmental Degradation: N/A

2. 5 Reconciliation of Unmet Need with Previously Allocated CDBG-DR Funds

DHCD received \$7,210,000 of FY13 CDBG-DR funds of which \$5,960,134 has been spent, allocated, or recommended for approval. (**See updated FY13 CDBG Action Plan**). The Charlemont target area unmet need of \$1,167,000 for infrastructure damage is less than the remaining unspent or unallocated CDBG-DR funds of \$1,249,866 for the state. However, it is higher than the HUD threshold of \$400,000. Assuming that the one of the other target areas (Springfield or Oak Bluffs target area) is accepted by HUD, then the unmet need in one of those areas plus the unmet need in the Charlemont target area exceeds DHCD's remaining unspent or unallocated CDBG-DR funds of \$1,249,866 for the state.

Exhibit C – Capacity

Commonwealth of Massachusetts

ExhibitCCapacityMA.pdf

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Grant Oversight and Management Capacity

Massachusetts Executive Office of Housing and Economic Development's Department of Housing and Community Development (DHCD) will manage this contract and oversee its implementation. DHCD strengthens cities, towns and neighborhoods and enhances quality of life by providing leadership, professional assistance and financial resources that promote affordable housing, economic vitality of communities and sound municipal management. DHCD is responsible for all MA programs and financial opportunities related to affordable housing, business improvement, economic development, and community services. It has the relevant project management, quality assurance, financial and procurement, and internal control capacity to quickly launch and implement a major project. DHCD administers HUD's Community Development Block Grant (CDBG) program as well as several other programs benefitting municipalities, private entities, and residents, including low to moderate income wage earners.

Partnership Capacity

DHCD and other state agencies have vast experience coordinating with federal, state, regional, local and private partners. We regularly collaborate on cross-disciplinary issues and work closely with the 351 municipalities across MA. The MA Team has the experience to immediately launch and implement a major effort in Phase 2. Team members offer strong experience in areas such as data analysis, public works, affordable housing, environmental quality, planning, community engagement, design and engineering, and economic revitalization. If a team member cannot participate, the Team has enough depth that another member with similar expertise will be able to fill that gap. Staff from the Executive Office of Energy and Environmental Affairs (EEA) wrote this application with assistance from DHCD.

Cross-Disciplinary Technical Capacity

Leadership Team

DHCD will provide administrative responsibility and ensure that activities under the grant comply with HUD requirements. *DHCD* has expertise in affordable housing, economic revitalization, economic development, community engagement, and data analysis. *EEA* will take the lead role in developing projects and preparing the Phase 2 application, if selected, and will work with partners and stakeholders to ensure proper project implementation. *EEA* is the Secretariat for the state's 6 environmental and energy agencies, offering expertise in environmental protection and restoration, clean energy, data analysis, water, coastal issues, habitat, recreation, agriculture, forestry, land, fisheries/wildlife, community engagement, design and engineering.

MA State Agency Partners

MA Department of Transportation (MassDOT) will implement all projects related to the state transportation infrastructure and will provide technical advice on matters related to highways, bridges, culverts, public transit, infrastructure vulnerability assessments and protection, data analysis, public works, environmental quality, community engagement, design and engineering. *MA Department of Public Health (DPH)* will work with local communities and their vulnerable populations on issues such as air quality, heat stress, emergency shelter, and communication strategies. *MA Emergency Management Agency (MEMA)* will provide expertise related to emergency response and disaster recovery through planning, training, and communications. *MA Historical Commission* is chaired by the Secretary of the Commonwealth and identifies, evaluates, and protects important historical and archaeological assets.

Federal Agency Partners

U.S. Environmental Protection Agency (EPA) will facilitate communication with other New England states, and will bring experience from its Community-Based Water Resiliency initiative, its Sustainable Communities initiative with HUD and U.S. DOT, and environmental protection. *U.S. Geological Survey (USGS)* will research natural resources; undertake data collection, analysis, and computer

modeling; develop scientific information, tools, and techniques. *USDA Natural Resources Conservation Service (NRCS)* will provide community engagement and technical assistance to farmers and forest land owners, data analysis, design and engineering.

Regional Planning Agencies/Regional Partners

Franklin Regional Council of Governments (FRCOG, 26 communities of Franklin County), Pioneer Valley Planning Commission (PVPC, 43 communities in Hampden and Hampshire counties), Berkshire Regional Planning Commission (BRPC, 32 communities in Berkshire County), Metropolitan Area Planning Council (MAPC, 101 communities in eastern MA), and Martha's Vineyard Commission (MVC, 7 towns of Martha's Vineyard and Gosnold) have expertise in planning, environmental quality, energy, emergency preparedness, transportation, housing, economic development, health, data analysis, public works, and community engagement. MAPC, PVPC, BRPC and FRCOG offer extensive experience on their recently completed 3-year HUD Sustainable Regional Plans, they strengthen the Team with HUD-related community outreach via public meetings, workshops, charrettes, surveys and other community involvement. MVC's interests include sea level rise and it has regulatory authority in 6 of 7 towns. Our regional planning agency (RPA) partners have the capacity to contract with other RPAs, should we develop Phase 2 projects in other areas. *MA Association of Conservation Districts* will be a liaison to local conservation districts and will provide community engagement, technical assistance on conservation planning and education, soil surveys, tree seedling sales, training, sediment/erosion control technical assistance, environmental quality, design and engineering. *MA Land Trust Coalition* will be land conservation technical services where conservation of buffers can improve flood control and resiliency and will be our liaison to land trusts and conservation organizations in MA. *NESCAUM*, a not-for-profit organization providing scientific, technical, analytical, and policy support to the air quality and climate programs of the 6 New England states, New Jersey, and New York, will develop a climate science clearinghouse to provide decision

makers and practitioners with access to data and analytical tools to assist with climate change planning. *Massachusetts Bays National Estuary Program (MassBays)*, an EPA National Estuary Program dedicated to protecting, restoring, and enhancing the estuarine resources of MA and Cape Cod Bays, will facilitate partnerships, convening stakeholders, and provide scientific basis for management decisions.

Universities

University of Massachusetts (UMass) at Amherst and Boston will provide expertise in scientific research, engineering, fisheries/wildlife, planning, natural systems, water, infrastructure, urban planning and design, public policy, coastal and ocean sciences, data collection and analysis, computer modeling, climate science, development of scientific information and tools, and includes: at UMass Amherst: the Massachusetts State Geologist; Departments of Geosciences, Environmental Conservation, and Civil and Environmental Engineering; MA Water Resources Research Center, and the federally supported Northeast Climate Science Center (NECSC); and at UMass Boston: the School for the Environment and several associated research facilities. *University of New Hampshire (UNH)* will provide data analysis, computer modeling of climate change effects, engineering, design and engineering, and public engagement, particularly around sea level rise, coastal surge, and downscaled precipitation and temperature predictions for climate change.

Community Organizers

MA Rivers Alliance will assist in engaging local watershed associations on issues related to environmental quality, data analysis, public works, public education, community engagement, and watershed restoration and protection. *The Boston Harbor Association* uses environmental quality, data analysis, public works, education, community engagement to promote restoration and protection of, and access to Boston Harbor and will assist in engaging local businesses, municipalities and residents, particularly on sea level rise and surge.

Municipalities

The City of Springfield, Town of Oak Bluffs, Town of Charlemont, and Village of Shelburne Falls, all of which are or contain target areas for this application are included as Partners.

Multi-Disciplinary Capacity

Nearly every major decision or project conducted by the state requires substantial coordination among affected parties. Past partnerships between state agencies have been strong. Each Team Partner has considerable experience working on projects with stakeholders that include federal, state and local levels of government; academia, regional planning organizations, consulting engineers, not-for-profit organizations, and local residents. Partners have a history of closely coordinating with each other to ensure that their activities are synchronized. The Global Warming Solutions Act requires MA to reduce greenhouse gas emissions. Led by EEA, the effort engages multiple agencies including MassDOT, EOHEd, DPH, and a multi-disciplinary advisory committee with varied points of view representing electric utilities, regional planning agencies, developers, environmentalists, and academicians.

Comprehensive Planning and Complex Program Capacity

Members of the MA Team regularly implement large, complex projects. EEA and its agencies oversee many large grant programs, administering hundreds of millions of dollars in funding for the purpose of land conservation, upgrades to water and wastewater infrastructure, dam and seawall removal and repair, green infrastructure, coastal resiliency, urban park, and more. MassDOT conducts long-term planning for development and upgrades to the state's airports, subways, and highways. Collectively, the five regional planning agency partners conduct planning for 200 of the state's 351 communities.

Technical Capacity to Identify and Assess Science-Based Information

EEA and its agencies has planners, engineers, and scientists with technical capabilities in coastal issues; infrastructure; energy; water resources; pollution and infrastructure; parks and recreation;

agriculture; and fisheries and wildlife. NECSC, part of a federal network of 8 Climate Science Centers, provides scientific information, tools, and techniques related to land, water, wildlife and cultural resources. Its partners, UMass Amherst, College of Menominee Nation, Columbia U, Marine Biological Laboratory, U of Minnesota, U of Missouri Columbia, U of Wisconsin-Madison, and U.S. Department of Interior agencies, provide resources for meeting regional needs for climate impact science assessment, education and stakeholder outreach. The MA Team also includes scientists at USGS, USDA Forest Service and NRCS, and climate researchers and scientists at UMass Boston and UNH. Other partners work closely with scientists to assess the potential impacts and vulnerabilities of climate change. MassDOT is working with UNH and UMass-Boston to assess vulnerabilities of its infrastructure to sea level rise and coastal surge. Using the results of sophisticated computer modeling, MassDOT is developing alternative strategies to address these impacts, taking into consideration cost, timeframe of impact, project life, and risk. The Boston Harbor Association, published Preparing for a Rising Tide, an examination of the effects of projected sea level rise and coastal surge in Boston, working with the same university scientists.

Civil Rights and Fair Housing Experience

DHCD is committed to creating fair and open access to affordable housing and promoting compliance with state and federal civil rights obligations. In its Affirmative Fair Housing Marketing and Resident Selection Plan Guidelines, DHCD requires that all privately assisted housing or housing for inclusion on the Subsidized Housing Inventory have an Affirmative Fair Housing Marketing and Resident Selection Plan. With respect to rental housing and Assisted Living Facilities, the affordable Use Restriction documents of said housing must require that the AFHMP, subject to the approval of the subsidizing or funding agency, shall be implemented for the term of the affordability restriction. DHCD has published its Affirmative Fair Housing and Civil Right Policy and Fair Housing Mission Statement and on its website, lists Principles Resources for Fair and Affordable Housing in MA. In its

Analysis of Impediments to Fair Housing Choice (2014), DHCD analyzes racial and economic disparities, including chapters on The Foreclosure Crisis and Impacts on Families and Neighborhoods of Color and Development with Rental Subsidies for Extremely Low Income Households.

Environmental Justice (EJ) is a high priority in MA. EEA's Secretary issued the state's first-ever EJ Policy in 2002. In November 2014, the Governor issued an Executive Order requiring EEA to update its EJ Policy, creating a new position and an Advisory Council to advise on EJ policies and practices. MA invests significantly into its 26 "Gateway Cities," including Springfield, which are defined as having median household incomes below the state average, populations greater than 35,000 and less than 250,000, and rates of educational attainment of a bachelor's degree (or higher) that are below the state average. MA's vision is that they actively participate in, and contribute to, the Commonwealth's overall economic success by taking advantage of their distinctive ability to be desirable locations for innovators, entrepreneurs and businesses and places where people with choices choose to live.

Design Quality Capacity

To ensure that Phase 2 includes a design quality that enhances long-term resilience, the Team will create a group to assess climate change projections and provide advice on sound, resilient design. In September 2015, NOAA will finalize Atlas 14 Volume 10, an analysis of precipitation frequency that will update Technical Paper 40, published in 1961. Rainfall frequency has intensified significantly since 1961; today a 100-year 24-hour storm in MA is estimated to be 8.0 to 8.5 inches compared to 6.5 inches. The lower rainfall is currently used in our federally funded highway projects, leading to undersized drainage systems that compromise roads and culverts during intense rain. Once the Atlas is finalized, it will be included in updated design standards, the MA Stormwater Handbook, and possibly an updated MA Stream Crossings Handbook, which provides guidance on minimizing impacts to aquatic habitat while constructing roadways. The MA Team's capacity to design or plan for long-term resilience is dependent on Partner capacity, especially on those who are able to help translate climate

science into usable, practical design standards. Those partners include NECSC, USGS, UMass, UNH, and MassDOT.

Capacity to Determine Reasonable Cost

DHCD, EEA and MassDOT are highly experienced in soliciting and reviewing bids for complex projects with large budgets and selecting contractors based on the combination of their abilities to successfully complete the job at the lowest cost, following state law on bidding procedures. EEA's agency Department of Conservation and Recreation administers FEMA's Hazard Mitigation Program and MassDOT is familiar with cost efficiency analyses. In an especially complicated and costly project, the state agencies may also consider using a value engineering consultant to assess and reduce project costs while ensuring that the project will function as intended.

Community Engagement Capacity

The MA Team has strong experience engaging community stakeholders and is committed to implementing a robust public process throughout this project. All state agencies coordinate closely with stakeholders, engaging them during development of strategies and approaches. EEA convened over 200 stakeholders in the development of the 2011 MA Climate Change Adaptation Report and met with stakeholders over 5 years, and held over 50 committee and workgroup meetings and several targeted stakeholder meetings to develop the Sustainable Water Management Initiative (SWMI). The agencies seek input from organizations likely to be affected but have few resources to act on that potential. Also, four planning agency partners recently completed 3-year HUD Sustainable Regional Plans that incorporated the results of extensive community outreach via public meetings, workshops, charrettes, surveys and other community involvement. In the past year, EEA, FRCOG, BRPC, and Franklin Land Trust completed 23 public meetings across the Deerfield and Hoosic watersheds and formed a 20-town advisory committee with representatives from each town and 8 regional environmental and business organizations that have met 4 times and will continue over the next year to

complete a regional conservation and economic development plan. EEA's Office of Coastal Zone Management (CZM) StormSmart Coasts program engages local officials and property owners, providing information, strategies, and tools to help communities and people working and living on the coast address the challenges of erosion, flooding, storms, sea level rise, and other climate change impacts. CZM publishes technical guidance, conducts pilot projects, and provides funding to enable floodplain management along the coast, reduce coastal erosion and storm damage while minimizing impacts to the shoreline and neighboring properties, and conduct vulnerability assessments.

Throughout development of this Phase 1 proposal, the MA Team has sought stakeholder involvement through 2 public hearings, a written comment period, meetings, emails and telephone calls. An even more robust process is planned for the Phase 2 proposal, when the MA Team will have another public notification period during which stakeholders will offer additional candidate target areas. The Team will work with target areas to develop projects for inclusion in the Phase 2 application. During Phase 2, the Team will implement project-specific stakeholder involvement, drawing from the extensive experience of stakeholders to ensure that projects are effective and beneficial to communities.

Capacity to Work with Community Leaders

DHCD and EEA have completed hundreds of HUD CDBG and state park construction grants over the past several years. The agencies have sought partnerships with all types of community leaders, ranging from the city mayors and state representatives to local community action organizations. The Team is experienced in implementing complex and controversial projects that involve divergent points of view and the need to work with affected entities to develop an amenable solution.

Regional or Multi-Governmental Capacity

Drawing from the experience of the state agencies, the four regional planning agencies that represent 200 Massachusetts communities; NESCAUM with affiliations with other New England states, New York, and regions of Canada; and federal agencies, the Team has a strong capacity to work regionally,

extending well beyond its target areas. Team members can reach large regional audiences, as demonstrated by the 4 HUD Sustainable Regional Plans using grassroots input to address regional natural resource, economic development, and infrastructure problems. The Deerfield/Hoosic natural resources and economic development initiative reached large regional areas using grassroots and involved coordination of 2 regional planning agencies with state and local government and non-profit organizations. While the Team may implement specific recovery measures in the target areas, the Team partners will promote resiliency project results and products over a broader region. The Team is able to develop projects benefitting vulnerable populations. An ongoing tree planting initiative will increase jobs in forestry and construction, and reduce heating/cooling costs, extreme heat (Urban Heat Island Effect), air pollution and costs associated with stormwater and combined sewage, thereby benefiting vulnerable populations.

Exhibit D – Need (Factor 2)

Commonwealth of Massachusetts

ExhibitDNeedMA.pdf

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Factor 2 – Need / Extent of the Problem

Subfactor: Unmet Recover Needs and Most Impacted and Distressed

Unmet Need in Target Areas and Beyond

Target areas of this application are Oak Bluffs on Martha's Vineyard; Shelburne Falls and Charlemont in the Deerfield River watershed; and Springfield, in Hampden County and in the Connecticut River watershed, of which the Deerfield is a tributary. Oak Bluffs experienced a destabilization of its coastal ecosystem and a breakdown of critical coastal infrastructure such as sea walls. Shelburne Falls was impacted by the intense river flows in the North River (tributary to the Deerfield River), which flooded the village's water supply wells and threatened to undermine the wells' stability. Charlemont saw a breakdown of public infrastructure with damage to culverts and roadways (Route 2), and destabilization of the surrounding floodplain. In Springfield, hundreds of houses were destroyed and damaged, trees and other vegetation were eliminated, and other municipal and commercial holdings were damaged. Details of unmet recovery needs are in Exhibit B.

Helping communities recover from disasters by addressing existing damage to infrastructure, housing and environment is the first step in addressing unmet recovery need, but we must go further. MA communities are often supported by 100+ year old infrastructure in desperate need of repair and replacement and designed using outdated estimates of precipitation and flooding. The natural landscape of MA has been significantly modified such that rivers have often been channelized, placed in culverts, and completely disassociated from floodplains thus compromising their structural integrity and fluvial geomorphology, and increasing flooding and flashiness, even during smaller storm events. Fragile coastlines have been developed, compromising salt marshes and dunes that provide natural habitat and protect communities from wind and flooding. With climate change, these changes pose a serious risk to infrastructure, housing, environment and economic well-being.

An unmet need across the state and in particular along the coast, in riverine corridors such as the Deerfield watershed, and in our aging cities such as those in Hampden County, is to upgrade existing crumbling infrastructure such as sea walls, culverts, and roadways, and to design them to withstand larger and more frequent storm events and storm surges, redesigning infrastructure to mimic natural systems, and to accommodate future changes in climatic conditions. We also need to restore rivers and floodplains, stabilize river banks, plant trees, and conserve land to avoid the devastation to environment, infrastructure, and economy experienced by communities in Franklin County during Hurricane Irene when streamflows in the Deerfield River blew out culverts, washed out Route 2, and created a transportation nightmare for low- to moderate- income families trying to go to work, buy food, and bring their children to school. Aged housing, designed against outdated building codes and in vulnerable areas, needs to be replaced or rehabilitated. We need to be sure that new or replacement housing in Springfield and in our other urban centers can withstand extreme winds, are energy efficient for heating and cooling, and are not in dangerous flood-prone areas. We need to consider patterns of development and conservation along the coastline, and develop strategies such as providing protective infrastructure (both gray and green), incentivizing the elevation of structures and their utilities, incentivizing property owners to move, and conserving land that provides protection.

With an opportunity to address these and other unmet needs in the target area and throughout the state using HUD CDBG funds, MA would jump-start localized efforts at restoring life to normalcy, revitalizing local economies, enhancing protection of the built environment, preserving and protecting public health and safety, and assembling the building blocks for communities to be robust, sustain thriving populations and businesses, that are resilient to changing climatic conditions. Phase 2 projects supporting recovery of unmet needs will be evaluated based on cost, ability to address issues, and whether they are supported by target area, if applicable. Projects addressing future climate change will also include analyses of various climate change scenarios and selection of designs that are protective,

cost-effective, are expected to endure over the projects' lifespans, taking into consideration their use and function. Some projects, like playgrounds and parking lots, may experience a lower risk of impact and need less protection incorporated into their designs. Projects addressing critical facilities such as power generation, treatment plants, transportation infrastructure, schools and hospitals, may need to address more extreme scenarios of future climate change in order to minimize risk and maintain the health and safety of communities, their populations and their built and natural environments. These solutions would be selected in consultation with our Team's technical experts, who are developing the latest climate change science.

Subfactor: Narrative on Post-Disaster Threats and Climate Change

Post-Disaster Threat and Climate Change – Observations and Predictions

Massachusetts' landscape ranges from densely populated cities to rural agricultural lands, and from very affluent neighborhoods to entire municipalities with low income communities. The state has had an increasing frequency and intensity of extreme weather. Between 2011 and 2013, several disasters ravaged the state – coastal storms, land-bound hurricanes, snow storms, and tornadoes – and they were particularly devastating to low- to moderate- income communities, including our target areas. Along the coast, winter storms and hurricanes, with storm surge, sea level rise, and localized land subsidence have put our development, infrastructure, human health, and ecosystems at incredible risk. Inland, extreme precipitation with resulting record-breaking river flows and an upsurge in tornadoes have compromised the structural integrity of buildings, bridges and roadways; destabilized riverine systems and infrastructure like culverts and bridges; and have disrupted livelihoods and local economies. These areas, after being hit several times by different disasters, within a relatively short span of time, do not have the economic base to recover from and mitigate for damages on their own.

Although FEMA money helped significantly, it still did not cover the cost of repairing and restoring the vast damage that occurred in its entirety. Also, the CDBG-DR funds that were allocated

did help in addressing more immediate needs of the communities; however, the damages far exceeded the assistance received. Details of CDBG funds and unmet recovery needs in target areas are in Exhibit B. Combined with climate change, cost to recover from extreme events could be prohibitively high. The average annual cost of climate change impacts to the U.S. could reach 2.6 percent of the gross domestic product by 2100 (Ackerman et al., 2009). The MA Team is committed to developing projects that address the post-disaster threats remaining as a result of existing unmet recovery needs and potential threat due to climate change. Team Members have been actively addressing these issues through the release of EEA's 2011 Climate Change Adaptation Report, which evaluated strategies to adapt to predicted climate change (REFERENCE), and its Coordinated Climate Preparedness Initiative; Exhibit F describes this initiative's many projects. The time is opportune to envision and create building blocks for a more resilient MA with anthropogenic and natural systems better equipped to cope with extremes and new climate change patterns.

Temperature. Records going back almost 200 years indicate that, since 1970, average temperatures in MA have increased nearly 0.5°F per decade, # of days above 90°F nearly doubled, and snowpack decreased. Winter temperatures increased faster than average temperatures. By 2100, MA is predicted to have 30-60 days with temp > 90° F and an increase of 5-10° F in average temp (Frumhoff et al., 2006, 2007). Projected extremes in temperature may also place a disproportionate burden on low- to moderate- income populations; the Commonwealth needs projects that address rising temperatures and can lead to solutions for low- to moderate- income populations who are not able to afford air cooling, especially those residing in urban areas where the heat island effect is predicted to be most profound.

Precipitation. Patterns of precipitation amount, frequency, and timing are changing. Data recorded by the US Historical Climatology Network indicates that precipitation in the Northeast has increased 5-10% since 1900. In the past few decades, more has fallen during winter as rain (Frumhoff et al., 2006, 2007; Hayhoe et al., 2006; Keim et al., 2005). In MA, except Cape Cod, the most recent 30-year

normal precipitation is the highest since records started in 1838 (MA Water Resources Commission, 2008). Over the past 50 years, average precipitation increased by 3.92 mm/year. Extreme precipitation in northern coastal New England increased since the 1970s (Douglas and Fairbank, 2010). Precipitation patterns are predicted to include higher intensity events, increased winter precipitation mostly in the form of rain, less snow, and more droughts which could profoundly impact our infrastructure, businesses, public health, water supplies, recreation, and ecosystems. Even under current climatic conditions, impacts from extreme events are costly. For example, flooding of the MBTA subway system in Boston in 1996 created over \$92 million in damages (Ruth et al., 2007). Extreme precipitation can overburden urban stormwater and combined sewage systems, causing flooding and water quality violations in waters near our low- to moderate- income populations, such as the Springfield target area. It can also cause runoff to pollute beaches and close shellfish beds, threatening the attractiveness of a tourist destination and shutting down food supplies in places such as the more Oak Bluffs target area. The Shelburne Falls target area's water supply was impacted by riverine flooding and scouring, while culverts and roadways got washed out in Charlemont by the intense precipitation of Hurricane Irene.

Sea Level Rise and Coastal Surge. The state's 1,500 miles of coastline faces a substantial rate of sea level rise and erosion and is naturally subsiding. Relative sea level rise (includes subsidence) was 9 inches between 1921 and 2006. This trend is predicted to continue at an increasing rate. Sea level in MA rise could be 6.6' by 2100. USGS identified the "Northeast Hotspot" along the Atlantic - in the past 40-60 years, sea level rose 3-4 times faster than it did globally (Sallenger et al 2012). Sea surface temperatures are predicted to increase 8°F and coastal areas are expected to experience greater storm surges. Superimposing surges onto increased sea levels further increases vulnerability of low-lying coastal areas, subjecting them to extensive flooding and damage to infrastructure and natural areas. Among U.S. cities, Boston is predicted to have the 4th highest risk of asset exposure due to sea level

rise; predicted asset exposure from a mid-century 100-year storm event is estimated to exceed \$400 billion while current asset exposure to a 100-year storm estimated at \$77 billion (Lenton et al., 2009). With the dense population and development that currently exists along the Massachusetts coastline, and the prevalence of old and inadequately designed infrastructure, impacts from climate change will only magnify if efforts are not initiated soon to either fortify, buffer or move them to less vulnerable areas. One study predicts evacuation costs in Massachusetts from sea level rise and coastal surge to range between \$2 billion and \$6.5 billion, depending on the severity of the storm event (Ruth et al., 2007). These extremely high costs will place a disproportionate burden on vulnerable populations including low- to moderate- income areas such as our target areas, elders living on fixed incomes, and workers who cannot afford alternative means of housing or transportation during disasters. In addition to causing flooding and destruction of environment, housing and infrastructure during extreme events, sea level rise can cause also have adverse effects gradually over time. For example, saltwater intrusion in coastal areas can contaminate water supplies and corrode pipes and other infrastructure. On Cape Cod, salt water is intruding below the groundwater lens and into water supply wells, thus decreasing the quantity of freshwater available for human consumption and natural habitats.

Addressing Threats and Hazards and the Tie-Back to Unmet Recovery Needs

The Team will select projects that enable communities to recover from and prepare for effects of climate change, including increased intensity of precipitation, sea level rise, coastal storm surge, high winds from tornadoes and hurricanes, and temperature increases. Although we will focus on low- to moderate- income areas, particularly our target areas, we are confident that in addressing the post-disaster threat and hazards in these areas, we will provide a benefit to the entire Commonwealth.

In rural riverine corridors and in built-out urban areas, we will work with communities to help them recover from and manage future increased precipitation and the effects on water quality and flooding. In particular, in the Springfield, Charlemont, and Shelburne Falls target areas, and in other

areas including western MA, we will seek to recharge water, prevent runoff, stabilize rivers, streams and floodplains; and repair and replace damaged or undersized infrastructure. For example, we are currently working with urban leaders to plant trees to soak up stormwater in Springfield, Chicopee, and Holyoke in Hampden County in partnership with three grassroots groups.

In areas affected by Hurricane Sandy, including the Oak Bluffs target area which suffered coastal flooding, damaged roads, eroded beaches, and damaged coastal facilities, we will work with the communities to update and upgrade key coastal infrastructure such as sea walls and tide gates so as to better protect economic centers and residential areas that are located immediately behind these structures. In addition, the Commonwealth would like to prioritize and enhance natural buffering capacity by creating and restoring habitats like salt marshes, barrier beaches and other wetlands and establish green infrastructure so as to create a system that works with nature. We will investigate the development of new tools to enable the public to envision the predictions of complicated sea level rise computer models. We will look at innovative examples of how to accommodate water in an urban setting, such as Boston's Living With Water Competition.

The MA Team will also work to help develop resilience to both the hurricanes and tornadoes which recently resulted in damage to permanent public infrastructure such as schools, roads, sidewalks, dams, culverts, infrastructure associated with water and wastewater treatment systems, and other municipal infrastructure. We will look for projects that make buildings more resilient so they can withstand repeated and more severe future such events. With support from the Centers for Disease Control and Prevention, DPH has been conducting a multi-year outreach effort and assessment to better understand the state of public shelters (or safe havens where residents can gather during extreme events) and communication strategies in each of the MA 351 municipalities. At the same time, DOER has been awarded grants for energy resiliency. Combining efforts like these in low- to moderate-

income areas would enable us to identify where shelter is needed and then ensure that it is cost-efficiently heated and cooled through the addition of energy resilient features.

The resiliency of Massachusetts communities, environment and economies—that is, their ability to accommodate impacts from both existing natural hazards and future climate change—will require planning, collaboration, and action, some of which has already begun at the state level and locally.

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Exhibit E – Soundness of Approach

Commonwealth of Massachusetts

ExhibitESoundnessofApproachMA.pdf

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Exhibit E – Soundness of Approach

Stakeholder Consultation and Involvement

The MA Team has a long history consulting the public on topics related to resiliency, climate change, and looking toward the future. To prepare the MA Climate Change Adaptation Report, which evaluated strategies for adapting to predicted climate change, EEA convened and chaired a 35-member Climate Change Adaptation Advisory Committee, with representatives having expertise in water, energy, transportation, built infrastructure, business, low income consumers, land conservation, local government, recreation, ecosystems, coastal zone and ocean, public health and safety, insurance, forestry, and agriculture. Five subcommittees with over 200 members provided support to the Advisory Committee. Participants included MA Team partners EOHED, MassDOT, MEMA, DPH, PVPC, MAPC, USGS, UMass and The Boston Harbor Association.

Four planning agency partners (MAPC, PVPC, BRPC and FRCOG) have recently completed 3-year HUD Sustainable Regional Plans that involved extensive community outreach via public meetings, workshops, charrettes, surveys and other community involvement. This extensive community engagement was incorporated into the four Sustainable Regional Plans.

In the past year, FRCOG, BRPC, Franklin Land Trust and EEA completed 23 public meetings across the Deerfield and Hoosic Rivers watersheds and have formed a 20-town advisory committee with representatives from each town and 8 regional environmental and business organizations that has met four times. This rich community engagement will continue over the next year to complete a regional conservation and economic development plan that will have an extensive list of recommendations for improvement of natural resources, infrastructure and economic development based on sustainable, local natural resources businesses and conservation activities.

To prepare for this Phase 1 application, the MA Team has been reaching out to local, state, federal, nonprofit, university and private stakeholders (see Appendix I). The consultations took the

form of emails, individual calls, sharing of data and information, site visits, and meetings. We reached out to project partners, including the regional planning agencies (Metropolitan Area Planning Council, Franklin Regional Council of Governments, Pioneer Valley Planning Commission, Berkshire Regional Planning Commission, the Martha's Vineyard Commission, and the Massachusetts Association of Regional Planning Agencies) that are on the front lines, communicating with the communities. We also reached out to the communities themselves. Following up on leads from regional planning agencies, MEMA, MassDOT, the MA State Geologist, and even newspaper articles detailing the ravages of particular disasters, we called and met with communities hoping to better understand the issues they faced during and since the disasters. We contacted officials from Oak Bluffs, Vineyard Haven, Charlemont, Fall River and dozens of other communities with needs that did not meet the HUD threshold criteria. We hope to include some of these as target areas in our Phase 2 application.

We met with Deerfield Watershed Creating Resilient Communities, an ad hoc group of political leaders, residents, scientists from UMass, engineers from NRCS and many others to learn about the many issues the area has been addressing since the catastrophic events of Hurricane Irene.

MA held two public hearings (ATTACHMENT), one in western MA and another in eastern MA, to hear about impacts from disasters, broad visions for resilience in MA, and pointed suggestions on particular site-specific issues. We also held two public comment periods (ATTACHMENT), one to solicit suggestions as the application was being prepared and another to receive public comments on the draft application.

Of particular note is our close coordination with the City of Springfield, another eligible applicant to HUD's National Disaster Resilience Competition. The MA Team has benefited from teleconference meetings with the City, and from Springfield's sharing of information regarding its unmet recovery needs. We are partnering on each other's projects and look forward to a strong and coordinated relationship between the two programs, should both applications be successful.

Concept for Resiliency

Massachusetts is eager to move toward the next step of climate change resiliency and preparedness. As we look to the future, we envision a state that has infrastructure and housing built to withstand changing climatic conditions especially extreme events, local residents living and working in areas designed to withstand increases in water and temperature, coastlines where communities are “living with” water, natural systems with thriving habitats, unimpeded rivers and streams meeting the ocean with vibrant and fully-functional floodplains and buffers, and a government structure with robust outreach and education programs designed to meet the needs of local communities and their vulnerable residents. We envision a state in which the diverse interests and needs of the communities are met, whether they are urban or rural, eastern or western, coastal or inland.

While addressing unmet recovery needs in target areas will provide a much needed jump-start to improvement of local conditions, an important aspect of our vision is a forward-looking approach to meeting future challenges of climate change head on, ensuring that the extent and amount of damage occurring from disasters such as hurricanes, storms, and tornadoes is minimized in the future. We are intent on planning and managing impacts of climate change before they occur and feel this is preferable to reactive responses after an impact takes place. This approach has the potential to reduce costs, minimize or prevent impacts to public health and safety, and minimize damage to crucial natural resources and built infrastructure. Both management and planning should be flexible, dynamic, and adaptive, and strategies must be continuously revisited and revised.

It is imperative to have robust natural and anthropogenic systems that can withstand weather extremes and long-term changes in climate. To that end, Massachusetts is extremely interested in fostering community-focused adaptation strategies with visioning, data and modeling, policy analysis, financial incentives, and appropriate regulatory structures provided at the state level. We have found

that there is tremendous need and we want to continue the open process to identify additional target areas and solidify projects ideas.

Project Ideas

The MA Team strategically selected four target areas for inclusion in Exhibit B: the Springfield, Oak Bluffs, Shelburne Falls (Buckland portion), and Charlemont target areas. Together, they have unmet recovery needs from all six federally declared disasters, ranging from snowstorms to hurricanes causing inland/riverine damage, to hurricanes causing coastal damage to tornadoes. This will enable us to develop a robust and comprehensive Phase 2 application that addresses all of these issues. During outreach for the Phase 1 application, we identified these target areas and a number of potential projects to include in our Phase 2 application. This engagement was enlightening and we plan to continue it, even before HUD announces its decisions regarding the Phase 1 applications, to identify additional target areas and to shape the best projects for our Phase 2 application.

Our ability to adapt to climate change will be improved through robust science, data collection and analysis; inclusion of climate change in the criteria and evaluation of programs; application of a climate change lens to current planning efforts; examination of funding opportunities and regulations to determine whether they should consider climate change; and continuation of current efforts to increase resilience and decrease vulnerabilities in a wide variety of public and private assets. Here are some project ideas to promote resiliency in MA:

1. Although Massachusetts does have counties, it does not have any real county government structure.

The Regional Planning Agencies (RPAs), some with regulatory authority, work at a cross-community scale to assist communities with their developmental, transportation, environmental and other issues. The MA Team proposes to set up a ‘**State-RPA Collaborative**’ for a structured bottom-up engagement and prioritization effort to promote a clear understanding and communication of local resiliency needs and a pooling of resources, equipment, and subject-expert

staff to achieve economies of scale. Many communities are low- to moderate- income, with a limited tax base, and often without paid staff, so sharing these resources between RPAs and with neighboring towns would help meet many local needs.

2. Post-Hurricane Sandy, the development community had a heightened awareness of the vulnerability of their properties to sea level rise, storm surge, and riverine flood waters. As a way to engage this community and to begin the process of making existing buildings more resilient to flood waters and coastal surges, we will establish a **'Resilient Building Competition'**. This would be modeled after the CZM-funded Living With Water Competition in Boston, and other similar efforts, and will provide developers and property owners an opportunity to put forth creative ideas on how to 'live with water' rather than to simply fortify against flooding.
3. Develop an **Energy Justice Program** that enables low- to moderate- income populations to gain access to the benefits of clean energy. Clean energy can help to reduce heating and cooling costs but its upfront costs are often a barrier to installation. This program would help to lower those barriers.
4. Create a **'Green by the Stream/Green by the Shore'** program to encourage green infrastructure and natural buffering of coasts and waterways, perhaps in the form of grants to communities. Hurricanes Irene and Sandy and many other smaller storms have all highlighted the need for natural buffers to protect our built environment. It is imperative that we prioritize, protect, restore, and construct *Green Infrastructure* to buffer key infrastructure and dense population areas. Green infrastructure has the multiple benefits of protecting upland and riparian areas, enhancing habitat and ecological values, and creating recreational and aesthetic opportunities for local citizens.
5. Create a **'Plant a Tree Program'** to increase tree planting in rural and urban areas. This project could engage local businesses, municipalities, federal agencies, and even school children. In the rural areas of Hampden County and most impacted and distressed areas of the Deerfield and

Hoosic Rivers watersheds (Mohawk Trail Woodlands Partnership), this project would focus on forest restoration, building stream and river buffers in farms, and an urban forestry program. The project could benefit from MA Department of Energy Resources' study of the establishment of a local wood pellet manufacturing plant to create that market, boost the local economy, and supply low cost fuel to heat local schools and residences. In urban areas, including Holyoke, Chicopee, and Springfield in Hampden County and other small manufacturing cities, this project would focus on implementing tree planting projects in target urban basins to provide relief from urban heat island, reduce winter heating costs, and reduce water pollution from stormwater and combined sewer overflow discharges.

6. Create a statewide interactive **Data and Mapping Tool**. Municipalities in Massachusetts, especially low- and moderate- income communities are in need of tools that will better help them understand location of their various natural and built environment, downscaled climate change predictions, the extent of the impact of climate change on their lands, a way to visualize how mitigation actions will help alleviate future damage and impacts, and a simple tool that local communities and program managers can use and communicate with. Massachusetts is strongly interested in extending the Climate Change Science Clearinghouse (CCSC) tool that NESCAUM has created for the state of New York. The broader goal is to have all of the Northeastern states to utilize a unified tool to allow for true regional and cross-boundary planning. This approach received support at the Coalition of Northeastern Governor's meeting last December.
7. **Sharpen the Science** by developing downscaled temperature and precipitation predictions, climate scenarios and other scientific information that will help policy-makers, developers, and municipal officials make appropriate decisions regarding the risks of climate change impacts. Develop tools that translate technical information, such as maps depicting the results of sea level rise modeling being conducted for MassDOT or interfaces that allow others to interact with the model, into user-

friendly tools and maps that can be used by others. This will help developers and others determine risk of various development alternatives.

8. **Incentives for Coastal Communities** would provide incentives to property owners to reduce the risk of coastal inundation; examples are funds to promote free-boarding or elevating buildings, move buildings, or buy out properties at risk.
9. Working with grassroots partners and RPAs, we will engage target areas in **Participatory Project Selection**, setting aside some funding so that they can identify areas most in need of those funds. This will empower the communities as they build resilience from the ground up.
10. Support Department of Public Health's **Outreach and Education** to municipal health officials and local boards of health collaboration, with a particular focus on reaching out to reach out to vulnerable populations.
11. We will implement a **Fix it First Program** to provide target areas an opportunity to receive funding to make repairs and facilitate recovery from past disasters.
12. Support the **Metro Mayors Coalition**, a groundbreaking coalition made up of 13 communities in Greater Boston. It is a voluntary forum where members exchange information and create solutions to common problems. MAPC helped to establish Metro Mayors in 2001, and provides staff support and financial administration. The municipal officials comprising this group represent over 1.2 million constituents and include mayors and managers from Boston, Braintree, Brookline, Cambridge, Chelsea, Everett, Malden, Melrose, Medford, Quincy, Revere, Somerville and Winthrop. Many of these communities have low- to moderate- income populations. Most recently, the Metro Mayors have banded together to address their common, regional resiliency issues. Boston Mayor Marty Walsh is scheduled to kick-off this new effort at a public event in April 2015.
13. **Collaborate with the Insurance Industry** to explore the relationship between resilient communities and insurance availability and affordability.

Subfactor: Potential Co-Benefits

The approaches highlighted above showcase themes and climate change adaptation strategies that resonate across multiple sectors. They have multiple benefits across political jurisdictions, crossing over many human-related sectors, and natural systems. Some of the approaches address climate change adaptation and can also be considered mitigation strategies because, in addition to contributing to increased resilience and preparedness to climate change, they concurrently achieve reductions in the greenhouse gas emissions that contribute to the problem. Other strategies have cross-cutting features such as measures that preserve, protect and restore natural habitats and the hydrology of watersheds. These strategies not only benefit natural resources and habitat, but can also play a critical role in protecting and increasing resilience of key infrastructure sectors, human health, and the local economy. For example, the approach to green infrastructure installation represents a regional approach to urban environmental restoration because multiple target cities are within the same watersheds (e.g. Holyoke and Chicopee on the Connecticut River) and will have cumulative benefits by mitigating impacts from flood events while having secondary benefits addressing stormwater pollution and treatment costs, energy costs, Urban Heat Island effects, air quality and resident health.

Subfactor: Addresses vulnerable populations

Structures such as buildings, roads, bridges, and dams that exist along rivers, the seashore, and in other vulnerable areas are more likely to be impacted from sea level rise and storms. Low income and vulnerable populations will disproportionately suffer the effects of extreme events, be least-equipped to adapt, and likely rely more heavily on government for support and relief. Of great risk to local government is its fiscal vulnerability, as damage to private property due to climate extremes may result in a reduction of the municipal tax base, while at the same time call for an increase in services for vulnerable populations, emergency response, and public and private infrastructure maintenance

upgrades or replacement. In areas with pre-existing low and moderately income residents, this issue is further exacerbated.

In general, some residents will be more susceptible to the effects of climate change, and adaptive change will be more difficult for them. Whether by virtue of economic status, social capacity and resources, health, age, or geography, adaptation efforts should include planning to meet the unique needs and conditions of the state's most vulnerable populations – including those with limited resources to take protective and adaptive measures and to recover after losses, and those coping with existing chronic illnesses that could be aggravated by the expected climatic changes. Children, the elderly, the disabled, and low-income groups, in particular, should be considered in any adaptive plan. Particularly vulnerable populations include the elderly; the very young; low-income groups; immigrants; the homeless; un- or under-insured people; residents with increased exposure to ambient asthmagens; residents of older or substandard housing; people who are geographically isolated from health care services; people with certain pre-existing conditions, especially asthma or lung dysfunction or compromised immune systems; and outdoor laborers such as farm and construction workers.

Many of the disasters that this proposal addresses have hit areas of low to moderate income. The year-round population in Martha's Vineyard is typically of lower income and economically less advantaged than the seasonal population that visits the island in the summer. In fact, Duke's County, of which Martha's Vineyard is a part, is one of the poorest counties in the state.

Hampden County has levels of poverty greater than the national average and unemployment rates equal to the national average. Southbridge, one of 2 towns impacted in Worcester County, has nearly 15% of its populations living below the poverty level and an unemployment rate of over 10%. Without assistance for recovery, the impacted communities cannot effectively recover from the events. Of the Worcester County damaged and destroyed structures, 74% were occupied by renters, 88% were uninsured, and 72% of the occupants qualify as low income. Of the damaged and destroyed Hampden

County structures, 37% were occupied by renters, 42% were uninsured and 30% of the occupants qualify as low income. Franklin County has a poverty level greater than the state average. It is very clear that these areas are in severe need of assistance to rebuild and make them more secure and resilient to future such events. Massachusetts through the various programs and approaches highlighted above is eager to be of assistance to these communities.

Current Commitment to Resilience

With our relevant backgrounds, The MA Team is able to implement programs that will enhance local economies, improve environmental stewardship, protect and preserve public health and safety, protect infrastructure, and address the needs of particularly vulnerable populations who may not have the ability to get out of harm's way. Our current commitment to resilience includes the many projects included in EEA's Coordinated Climate Preparedness Initiative. Elements of this initiative and other ongoing efforts are listed in Exhibits F and G and provide a solid foundation for implementing such our vision for resilience.

The MA Climate Change Adaptation Report (<http://www.mass.gov/eea/air-water-climate-change/climate-change/climate-change-adaptation-report.html>) has been guiding the state since it was published in 2011. Key strategies of the report are: perform risk and vulnerability assessments, develop up-to-date and accurate information, models, and decision-support tools, minimize impacts through effective planning and management, implement measures that preserve, protect and restore natural habitats and hydrology, and assess and enhance emergency management tools and capabilities. The report also provides discipline-specific strategies such as protecting ecosystems and maintaining ecosystem health and diversity for protection of natural systems, and including climate change in building practices and using natural systems for protection of infrastructure.

Exhibit F – Leverage

Commonwealth of Massachusetts

ExhibitFLeverageMA.pdf

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Exhibit F – Leverage

Outcomes

Longevity and Magnitude. Massachusetts is committed to the recovery of communities from past disasters and to strengthening their resilience and preparedness to future climate change. In developing resiliency solutions for communities, environment and infrastructure, the Massachusetts team will seek solutions that are long-lasting and will require little ongoing maintenance. A local example of such a project is the U.S Army Corps of Engineers' Charles River Natural Valley Storage Area which involved the acquisition and permanent protection in the 1970s of 17 scattered wetlands in the middle and upper watershed (8,103 acres) for the purpose of flood protection.

Co-Benefits. MA Department of Energy Resource's (DOER) Community Clean Energy Resiliency Initiative, proposed as leverage and a long-term commitment for this project, has funded over 10 renewable energy projects since September 17, 2104. In addition to promoting energy, these projects also help to reduce greenhouse gas emissions. As an example of a leveraged green infrastructure project with co-benefits, EEA and other members of the Massachusetts Team, with local grass-roots environmental justice partners, are re-planting trees in the Springfield target area and in surrounding low- to moderate- income cities of Chicopee and Holyoke to aid in the recovery of urban trees lost in past disasters. Team members completed extensive community engagement including public meetings and door-to-door outreach about tree planting benefits in affected neighborhoods and have used an efficient method to re-plant 15,000 trees in 4 years. This regional approach to urban environmental restoration offers cumulative benefits by alleviating flooding as well as water pollution, treatment costs, energy costs, urban heat island effects and air quality impacts to residents of vulnerable health. A tree pit reduces stormwater equivalent to the reduction of 1,200 square feet of impervious surface (REFERENCE). Additionally, studies show that each 1% increase in urban tree canopy results in a 1%+ reduction in household heating and cooling costs. (REFERENCES for Worcester, MA,

Springfield, MA, Sacramento, CA and Hutchinson, MN). Forest restoration will also benefit the rural areas of Hampden County and the most impacted and distressed target areas in the Deerfield and neighboring watersheds. EEA's Department of Energy Resources (DOER) is completing a comprehensive assessment of the feasibility of locating a wood pellet plant in the region.

Sustainability. The Massachusetts Team will work with the target areas and elsewhere in the state to develop strategies that encourage sustainability. The example above demonstrates how a community tree planting effort is both environmentally sustainable by providing water quality benefits, and flood and storm hazard mitigation; and is financially sustainable by reducing heating and cooling cost, providing low cost heat options (via local wood pellets harvested to improve forest resilience) and increasing local job opportunities in the forestry sector.

Vulnerable Populations and Opportunity. The target areas in this application represent two tourist destinations, one rural hill-town, and one industrialized area. The Team will look for projects that address past losses and future threat of disasters but also provide an opportunity to stimulate the economy. For example, follow-up to the MassDOT survey of 1,000 culverts in the Deerfield River watershed may result in an opportunity for construction employment; increased tree planting could result in more forestry jobs.

Success and Evaluation Measures. The Massachusetts Team will develop meaningful measures that are relevant to local populations and based on best available information. We will measure success of the program by examining improvements in local circumstances such as employment opportunities, environmental conditions, and repaired infrastructure. But we will go well beyond that, looking for increased resilience of our vulnerable populations to the increasing frequency and severity of disasters that Massachusetts faces. We will work with our communities to develop measures that are cost-effective, fair, responsive and easily understood.

Leverage

Partners. With the state as the lead applicant and five regional planning agencies representing over 200 communities, our partners have considerable experience working with communities and organizations at the local level. We regularly work with environmental justice groups such as Nuestras Raices in Holyoke, Valley Opportunity Council in Chicopee, ReGreen Springfield, and Chelsea Collaborative. In addition, MA Rivers Alliance, MA Bays Estuaries Program, and The Boston Harbor Association are local organizations that have developed strong partnerships with residents and other organizations.

Co-Benefits and Cost Efficiencies of Financing. Massachusetts is experienced in using streams of public money innovatively to serve multiple purposes. For example, it uses RGGI funds to pay for tree planting. The Natural Valley Storage Area project described above was developed, in part, to respond to local opposition to hard-scaped flood-proofing that would have damaged the environment. This alternative to a series of dams was more cost-effective to establish, requires no maintenance, and is a local recreational attraction. Improvement of the local beaches and roadways in the Oak Bluffs target area may encourage tourists who arrive in Oak Bluffs by ferry to stay longer and spend some money before travelling to other towns on the Vineyard. Improvements to stream banks and floodplains in the Deerfield will help protect public water supplies, and make other infrastructure like culverts more secure.

Committed Leverage Resources in and Beyond Target Areas. Commitments at the state, regional, and local levels of government that broaden the reach of our resiliency objectives are evident through Massachusetts' recent multi-Secretariat initiative to enhance climate resiliency and preparedness. DOER's Community Clean Energy Resiliency and EEA's Dam/Seawall Repair and Removal Fund are described in Exhibit G. Committed leveraged resources far exceed HUD's threshold of \$250,000 (Exhibit G). Other commitments are:

Coastal Community Resilience Program. EEA's Office of Coastal Zone Management (CZM) grants funding to encourage resilience in coastal communities to storms/sea level rise.

Light Detection and Ranging (LiDAR). LiDAR data, essential for mapping high resolution topography, is being collected in central and western MA, where there are data gaps.

Green Infrastructure Pilot Program. CZM's grant funding to coastal communities for flood control and storm surge reduction projects involving measures such as dune enhancement, marsh restoration.

MassDOT Stream Crossings. MassDOT and UMass-Amherst pilot project to address vulnerability of road crossings over streams (1000 culverts) in the Deerfield River watershed.

MassDOT Vulnerability Assessment. Assessment to prioritize high risk hazards and assets. The team will develop tools to educate stakeholders and inform future investments, planning, and design.

MassDOT Central Artery Flood Risk Project. Modeling effects of surge and sea level rise on the Central Artery system and MBTA. Model being expanded to the entire MA coastline.

Land Use Priority Plans. MA, working with regional planning agencies and local governments, is producing plans for future land conservation and development that will inform project investments.

Park Investment. MA is investing in parks, which can serve as areas of green infrastructure.

State Revolving Fund. MA invests hundreds of millions of dollars per year to upgrade water and wastewater infrastructure. This includes developing of clean energy projects and abating combined sewer overflows.

Exhibit G – Long-Term Commitment

Commonwealth of Massachusetts

ExhibitGLongTermCommitmentMA.pdf

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Long-Term Commitment

In 2014, the Commonwealth prioritized climate resilience and preparedness actions and investments (Exhibit F), addressing impacts on our transportation and energy assets, built and natural environments, and the public health of our residents. Ongoing commitments include:

Dam and Seawall Repair and Removal Fund. The Dam and Seawall Repair or Removal Fund was established in 2013 by the Massachusetts Legislature for the repair and removal of dams, levees, seawalls, and other forms of flood control. Since September 17, 2014, EEA has signed or committed \$979,729 in grants and \$4,420,271 in loans to municipalities to repair or remove their dams and seawalls (Appendix X). An award to Randolph for critical repairs to the Morse Reservoir helped to protect the drinking water supply for 40,759 people.

Community Clean Energy Resiliency. Since September 17, 2014, EEA's Department of Energy Resources has invested \$25,829,933 (Appendix X) in municipal clean energy resilience grants to municipal/regional entities to harden critical energy services using clean energy technology, including solar, electric storage, combined heat/power, renewable thermal, fuel cells, district energy, and micro grids, awarding 19 grants to municipalities, hospitals, regional wastewater treatment utilities, and electric cooperatives. A \$611,000 grant to the Greater Lawrence Sanitary District benefited nearly 200,000 people in 5 communities in northern MA and southern New Hampshire, including areas of low- to moderate- income. A grant of \$2,790,099 to Baystate Health in Springfield benefited the western region of MA. According to the hospital's website, 7% of gross regional product generated in Hampden, Hampshire, and Franklin counties is either directly or indirectly attributable to Baystate Health, and jobs and earnings supported by Baystate represent nearly 11,000 households in MA (<http://www.baystatehealth.org/Baystate/Main+Nav/About+Us>).